

System Stress Test Assessment

Atlas Design Panel 1

Checkout and Launch Control Systems (CLCS)

84K00303-027

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SYSTEM STRESS TEST ASSESSMENT

DESIGN PANEL 1

CHECKOUT AND LAUNCH CONTROL SYSTEMS (CLCS)

1.

IN

1.1 SYSTEM STRESS TEST THREAD OVERVIEW.

This thread will evaluate if the CLCS architecture will be able to support system load conditions. This thread will build on the Thor work.

Highlights:

- Demonstration of the system under several load conditions.
- Support Performance requirement Buy Off

1.2 SYSTEM STRESS TEST THREAD CONCEPT

The focus of this thread is to establish a performance baseline for the system using the Atlas Release software. The baseline numbers will be determine for different processing areas of the system architecture. The different processing areas or as it will now be called the SST components have been identified and are show in Figure 1. Some of the components will run while the system is processing data at a nominal rate and the others will run on their own. Each component will have the capability to “ramp-up” the load automatically to determine the system break point. See Appendix A for a detailed description of each component.

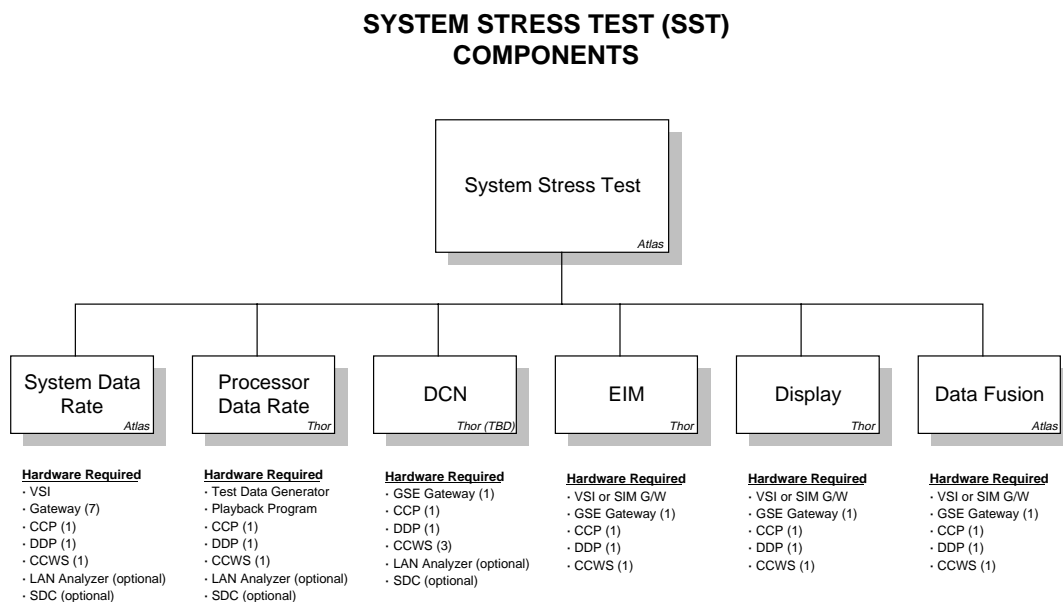


Figure 1

This thread consists of the following main items:

- Use SGOS Models as data source
- Connect to VSI
- Utilize Regression Test Tool to control stress test(TBD)
- Expand Validation TCID if necessary
- Expand/enhance test tool capabilities developed for Thor
- Maximize automation for test control

1.3 SYSTEM STRESS TEST THREAD SPECIFICATION

1.3.1 Statement of Work

~~Perform Stress Test developed in Thor on Thor Baseline.~~

- Perform [Atlas developed Stress](#) Test with Atlas Baseline.
- Simulate using real Gateways, ~~45~~ Ground Support Equipment busses, 1 PCM Down Link, ~~13~~ Space Shuttle Main Engine links and 1 Launch Data Bus running at rates up to all data changing.
- Utilize a test TCID with:
 - 100 to 200 test FDs
 - ~~Data for 1 format of PCM downlist FDs~~
 - [Data for 1 format of OI downlink FDs](#)
 - [Data for 1 format of GPC downlist FDs](#)
 - Shuttle Main Engine FDs
 - ~~HMF FDs~~
 - Selective Launch data Bus Command FDs
- Provide a group of simple Data Fusion functions for 100 of the test FDs
- Provide a set of SGOS models to drive test FDs.
- Provide a group of test End Item Managers to support system testing ~~based on Thor developed End Item Managers.~~
- Perform testing of Recording Interface.
- Build two End Item Managers that respond to Ground Support Equipment inputs.
 - Schedule with Constrain Notification and/or timer.
 - When input Discrete changes output a command to set Discrete output
 - When input Discrete changes output a command to look for input to change back.
 - Increment a counter.
 - Cross connect output from one [End Item Manger](#) to input ~~of the~~ other.
- Perform testing of Gateway performance.
- Provide performance data for system modeling.
- Provide a mechanism to increase load beyond the performance requirements.

1.3.2 Requirements

(SLS-2.2.2.1.1) The system shall support 25,000 End-Item Function Designator changes per second continuously. This is the "system maximum data bandwidth".

(SLS-2.2.2.1.2) The system shall support a peak of 50,000 End-Item Function Designator changes in a given second without losing any data.

Rationale: The system will need to have a flow control mechanism to support buffering instead of losing data when peak change rates occur. This system is being used to consolidate several systems. Some of these systems and their rates are TBD. Therefore the above requirements are written with expansion in mind. We do not want to say the system will support all changes on all links.

(SLS-2.2.2.1.3) The system shall support 1,000 End-Item Function Designator changes during a 10 millisecond period.

(SLS-2.2.2.1.15) The Data Health Function shall support the "system maximum data bandwidth".

(SLS-2.2.2.1.16) The Data Fusion function shall support the "system maximum data bandwidth" with one fusion calculation per change.

Rationale: Although our goal is to execute the fusion algorithms within one System Synchronous Rate Time Period no time limit requirement is included. During peak data rate times the algorithm must support a lag in Fusion calculations. However, to assure that time critical functions are executed in a timely fashion, Data Fusion will provide a priority mechanism (ref. Section 2.2.5 - System Support for User Applications/Data Fusion.).

(SLS-2.2.2.1.17) The Constraint Function's data limit function shall support three constraint checks per measurement FD while supporting the "system maximum data bandwidth", including Fusion FDs.

(SLS-2.2.2.1.18) The Constraint Manager notification function shall be capable of providing 100 notifications per second while supporting the "system maximum data bandwidth".

(SLS-2.2.2.1.19) The data distribution function shall support the "system maximum data bandwidth", plus 5,000 (20%) Data Fusion updates per second.

(SLS-2.2.2.1.21) The system shall support (while executing at 40 percent of the system maximum data bandwidth) 25 Constraint Management requests from each of 4 Command and Control Processor Subsystems (100 Total), 20 constraint event notifications (5 per CCP), and 4 commands (1 per CCP) with each CCP executing 20 User Test Applications which are executing 500 Application Service calls per second.

(SLS-2.2.2.2.1) The Display function shall, for a single workstation, support updating 50% of the FD's every second on 13 windows with 100 FD's in each window.

(SLS-2.2.2.2.2) RTPS shall be able to support full Uplink command rates on the following links:

- LDB - 8/second
- *PCM Uplink - 16.67/second or 50/second*
- GSE - 500/second.

(SLS-2.2.2.2.6) The Display function shall, for a single workstation, support updating of 250 displayed FDs out of 500 in one second.

(SLS-2.2.2.2.7) The Display function shall, for a single workstation, support updating 50% of the FD's every second on 13 windows with 100 FD's in each window.

(SLS-2.2.2.2.11) Each CCP shall support 5 End-Item System test applications, with 6 test applications for each System (30 Processes) with each test application executing 500 Application Service calls per second (15,000 calls/second) while executing at 5 percent of the system maximum data bandwidth (TBD). The ratio of application service calls are 45 local application services (read, if, compare, etc.), 4 constraint management notification changes and 1 command for every 50 calls. The test applications are to be the same priority level and each is allowed to execute at least 10 times per second.

1.4 SYSTEM STRESS TEST THREAD ATLAS HARDWARE DIAGRAM

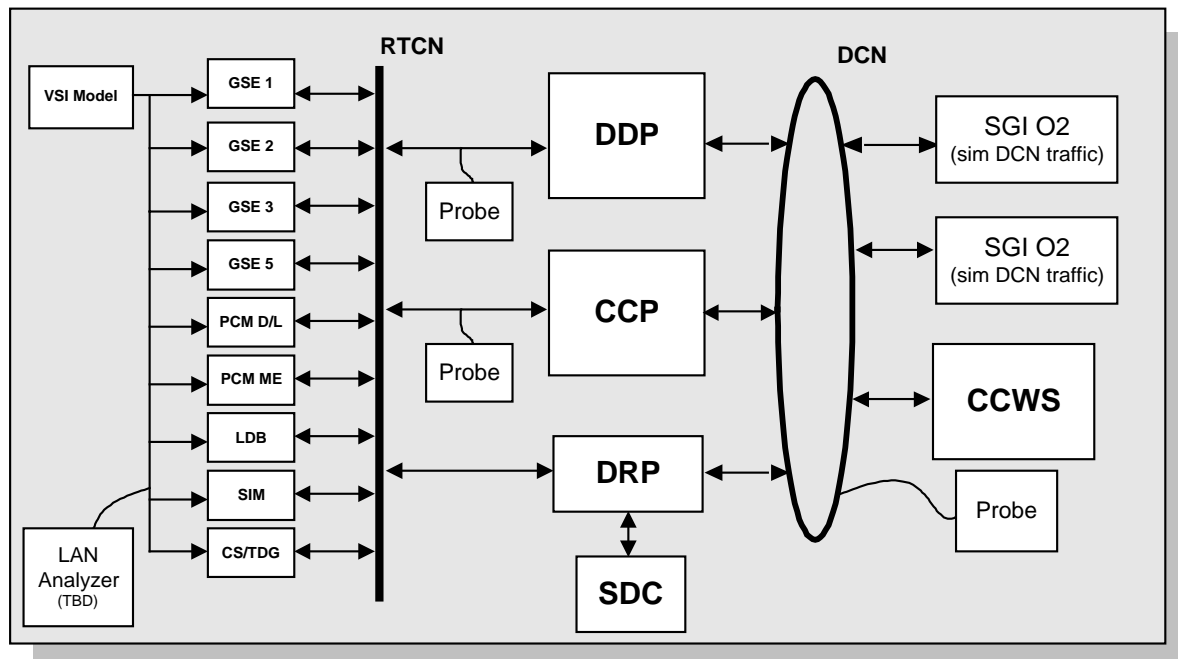


Figure 2 - System Stress Test Atlas Configuration

1.5 SYSTEM STRESS TEST THREAD DELIVERABLES

Software:

Deliverable	R&D	Code	API Manual	Users Guide
SGOS Models	Yes	Yes		Yes
DCN Test Tools	Yes	Yes		Yes
Stress Test EIMs	Yes	Yes		Yes
SL Displays	Yes	Yes		Yes
Data Fusion Algorithms	Yes	Yes		Yes

Documents:

Deliverable	Document
Stress Test Concept (updated)	X
System Stress Test Plan and Procedures	X
System Stress Test Report	X

1.6 SYSTEM STRESS TEST THREAD ASSESSMENT SUMMARY

1.6.1 Labor Assessments

The total Labor Costs required to provide this capability are summarized in the following table:

No.	CSCI/HWCI Name	Atlas LM	Changes covered in
1	Application Services - User Display Services (SL Displays)	1.0	
2	System Services - DCN Test tools	2.0	
3	EIM Services	3.0	
4	Data Fusion Services	1.0	
5	Test, Build & Control	0.0	Utilize Validation TCID
6	SGOS Model	0.5	
7	Performance Modeling (testing support)	1.0	
8	Update Stress Test Concept	1.0	
9	Update System Stress Test Plan	1.0	
10	Perform System Stress Test	2.0	
11	Generate System Stress Test Report	0.5	
	TOTAL	13.0 LM	

1.6.2 Hardware Costs

Any hardware (network) analysis tools are assumed to be available.

1.6.3 System Stress Test Thread Procurement

None

1.7 SYSTEM STRESS TEST THREAD SCHEDULE & DEPENDENCIES

1.7.1 Schedule

Task Name	Start	Finish
Atlas Assessment Kickoff		01/20/98
Concept Panel Internal Review		03/17/98
Concept Panel		03/19/98
Atlas Development		
Requirement Panel		N/A
Design Panel		N/A
Concept Doc (update)		07/01/98
Test Plan (update)		08/24/98
Test Tools Complete (EIM, Network, Display, etc)		09/07/98
SGOS Models Complete		09/07/98
Test Plan Procedures		09/30/98
Perform Stress Test		10/98
Test Report complete	2 weeks after stress test completed	

1.7.2 Dependencies

No.	Dependency Area	Dependency	Need Date
1	Networks	Network analysis tools (COTS)	10/05/98 - 10/16/98
2	Gateway	Test Data generator (TDG)	10/05/98 - 10/16/98
3	Gateway	PCM D/L, ME, LDB, & GSE Gateways	10/05/98 - 10/16/98

No.	Dependency Area	Dependency	Need Date
4	Operations	VSI	10/05/98 - 10/1698

1.8 SYSTEM STRESS TEST THREAD SIMULATION REQUIREMENTS

None

1.9 SYSTEM STRESS TEST THREAD INTEGRATION AND SYSTEM TEST

The stress test will be performed on a system configured with the Atlas Release Software. The TCID used will be the Validation TCID and the SCID used will include System Stress Test unique test tool products.

The Stimuli includes:

- SGOS models used as the data source
- Network test tool used to generate traffic on DCN
- VSI model used to respond to issue commands
- EIMs used to initiate/stimulate system processes

The analysis includes:

- using COTS performance monitoring tools to analyze system parameters (measure CPU, memory & I/O utilization)
- using vendor supplied performance monitoring utilities
- using a LAN analyzer and/or manager to measure network data rates and collect statistics
- viewing System messages for verification purposes

The system test plan should include procedures to increase or decrease the following loads on an individual basis:

- RTCN traffic (change data)
- DCN traffic
- Command rate
- EIM processes
- Dynamic display processes

System Stress Test Plan and Procedures will be prepared by the System Test Organization

This test will be performed immediately following the Atlas Release System Test efforts.

1.10 SYSTEM STRESS TEST THREAD TRAINING REQUIREMENTS

None

1.11 SYSTEM STRESS TEST THREAD FACILITIES REQUIREMENTS

None

1.12 TRAVEL REQUIREMENTS

None

1.13 SYSTEM STRESS TEST THREAD ACTION ITEMS/RESOLUTION

None

2.

This section is provided for the individual CSCI leads to fill in and provide the details of their assessments. The lead should use this information to provide the summaries in section 1. The details are not presented in any of the panels unless needed by the presenter as backup.

2.1 COMMON APPLICATION SUPPORT CSCI ASSESSMENT

Provide a short overview description of the changes necessary to CSCI Name.

Stress Test SL-GMS Displays Work Required

This is a list of work to be accomplished for this function.

CSCI Assessment**Example:**

CSC Name	CSC Labor (LM)	% of CSC

Basis of estimate

Provide your basis for estimating the labor to implement this capability. Lines of lines of code is one way to estimate the labor requirements. Your CSCs may be developed in such a way as to make this impractical (e.g., large amount of reuse code or code generated by a tool).

Documentation

Provide your assessment of the kinds and amount of documentation that must be provided with the capability.

Example:

Document Type	New/Update	Number of Pages
---------------	------------	-----------------

Document Type	New/Update	Number of Pages
Requirements and Design Documentation		
Users Guide		
API Interface Document		
Interface Design Document		
Test Procedure		

Assumptions

Provide a list of assumptions you made that are pertinent to the assessment. If there are no assumptions state none.

Open Issues

Provide a list of open issues if there are any. If there are none state none.

2.2 COMMON APPLICATION SUPPORT CSCI ASSESSMENT

Provide a short overview description of the changes necessary to CSCI Name.

Stress Test Data Fusion Algorithms Work Required

This is a list of work to be accomplished for this function.

2.3 SYSTEM SERVICES CSCI ASSESSMENT

Provide a short overview description of the changes necessary to CSCI Name.

Network Services CSC Work Required

This is a list of work to be accomplished for this function.

2.4 APPLICATIONS SERVICES CSCI ASSESSMENT

Provide a short overview description of the changes necessary to CSCI Name.

System Stress Test EIMs Work Required

This is a list of work to be accomplished for this function.

CSC Name 2 Work Required

This is a list of work to be accomplished for this function.

CSCI Assessment

Example:

CSC Name	CSC Labor (LM)	% of CSC

Basis of estimate

Provide your basis for estimating the labor to implement this capability. Lines of lines of code is one way to estimate the labor requirements. Your CSCs may be developed in such a way as to make this impractical (e.g., large amount of reuse code or code generated by a tool).

Documentation

Provide your assessment of the kinds and amount of documentation that must be provided with the capability.

Example:

Document Type	New/Update	Number of Pages
Requirements and Design Documentation		
Users Guide		
API Interface Document		
Interface Design Document		
Test Procedure		

Assumptions

Provide a list of assumptions you made that are pertinent to the assessment. If there are no assumptions state none.

Open Issues

Provide a list of open issues if there are any. If there are none state none.

2.5 SGOS MODEL CSCI ASSESSMENT

Provide a short overview description of the changes necessary to CSCI Name.

Stress Test Model Work Required

This is a list of work to be accomplished for this function.

CSCI Assessment**Example:**

CSC Name	CSC Labor (LM)	% of CSC

Basis of estimate

Provide your basis for estimating the labor to implement this capability. Lines of lines of code is one way to estimate the labor requirements. Your CSCs may be developed in such a way as to make this impractical (e.g., large amount of reuse code or code generated by a tool).

Documentation

Provide your assessment of the kinds and amount of documentation that must be provided with the capability.

Example:

Document Type	New/Update	Number of Pages
Requirements and Design Documentation		
Users Guide		
API Interface Document		
Interface Design Document		
Test Procedure		

Assumptions

Provide a list of assumptions you made that are pertinent to the assessment. If there are no assumptions state none.

Open Issues

Provide a list of open issues if there are any. If there are none state none.

2.6 PERFORMANCE MODELING SUPPORT**Work Required**

Provide inputs to Stress Test development and development of System Stress Test Procedures.

Assessment

Name	Labor (LM)
------	------------

Name	Labor (LM)
System Stress Test support	1

3.**HV**

None

4.**CA****4.1 SW PRODUCTS DEPENDENCY LIST**

None

4.2 HW PRODUCTS DEPENDENCY LIST

Network analyzer and/or manager assumed available.